Software hands-on session at LAL

ENS-LAL

LAL/IN2P3

2014-02-13

Introduction

Goals

- know how to use software and computers within research groups
- know a few mechanisms, tools and workflows for software development
  - configuration management
  - version management
  - documentation
- software development good practices
- a few handles on object oriented methodologies
- elements about current technologies
  - C++ language
  - data structures definition
  - graphical applications

Organization/Agenda/Schedule

Schedule

- 5-8 days: $9h \Rightarrow 12h$, $14h \Rightarrow 17h$
- Building 203 - Room 203

Teachers - Engineers at LAL

Sébastien Binet, Laurent Garnier, Antoine Pérus

One `MacOSX-10.6` machine per pair of students

- each machine has its own set of preconfigured software tools
- all tools needed during the hands-on sessions are pre-installed
- a default account is defined:
  - user name is `ens<nn>` (depending on the machine)
  - password is `ens<AAAA>` (modify it ASAP!)

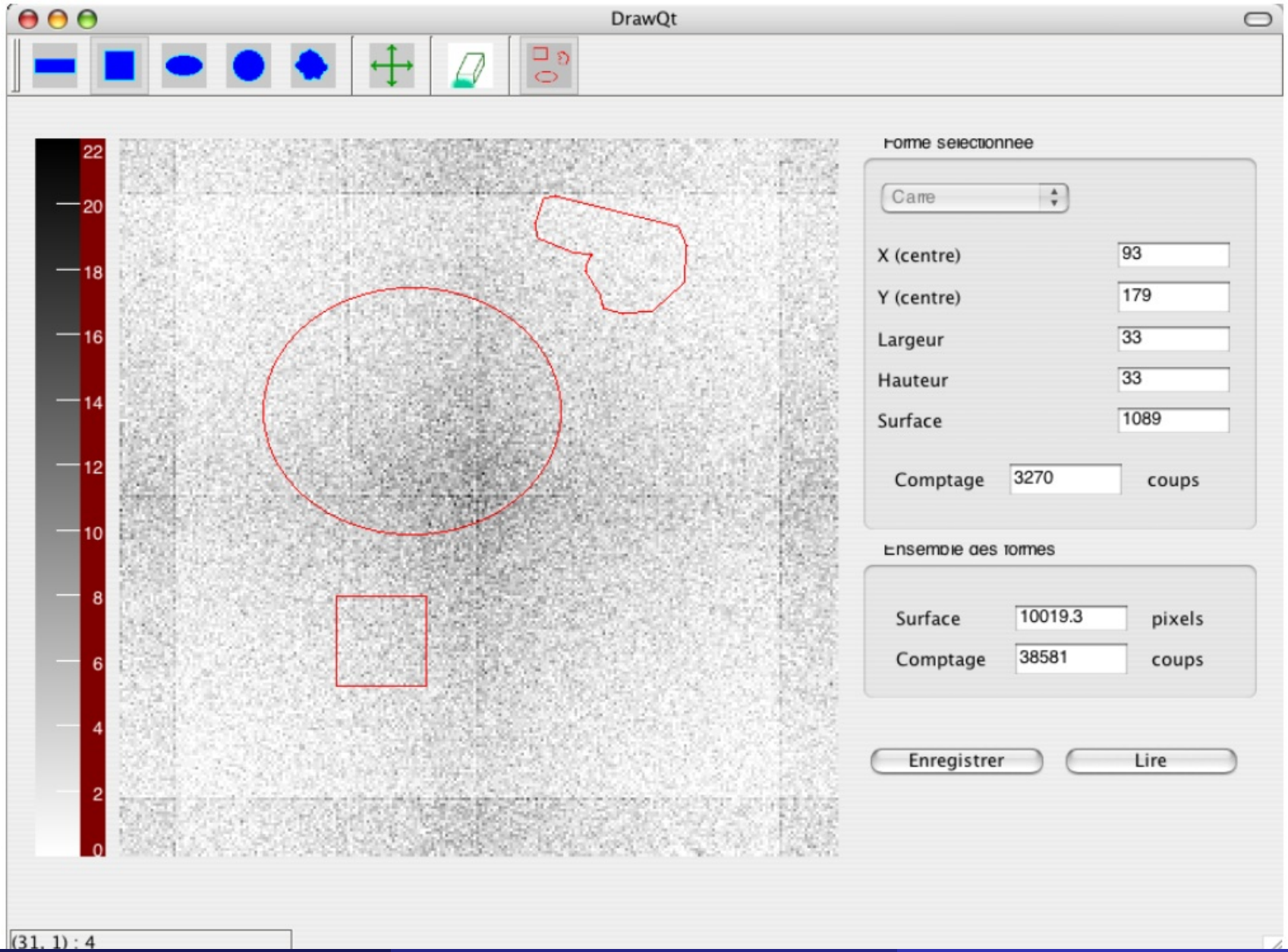
Organization/Agenda/Schedule - II

Documentation: http://ens.lal.in2p3.fr

Hands-on sessions' outline

- Starting point is an application loosely inspired from a real scientific application (2d-image processing) but modified for pedagogical purposes.
- Along the way, we'll progressively investigate various related aspects about technologies of programming:
  - organize and plan software development
  - introduce (and use) a workflow
- Reimplement some of the features of the original application
- Leverage a few software tools currently used in research environments
  - these tools are not necessarily standards /per se/ but are used at large in our community and are good examples of what is available at large anyways.

DrawQt


DrawQt
22
20
18
16
14
12
10
8
6
4
2
0
Forme selectionnee
Carre
X (centre)
93
Y (centre)
179
Largeur
33
Hauteur
33
Surface
1089
Comptage
3270
coups
Ensemble des formes
Surface
10019.3
pixels
Comptage
38581
coups
Enregistrer
Lire
(31, 1) : 4

DrawQt

- Study and process images, recorded by an imaging system processing biological samples
- we'll define (by hand) subsets of these images to infer characterizations (so interesting regions are isolated)
- these regions are constructed from various geometrical shapes (rectangles, polygons, circles, ...)
- we'll then apply analysis algorithms onto these regions of interest:
  - hit counters
  - areas estimates
  - etc ...
- The final application will allow the scientist:
  - to access the basic and test images,
  - to construct and manage regions of interest
  - to apply analysis algorithms on these images

DrawQt - outline

- Investigate, sequentially and/or in parallel:
  - how to organize and manage software development
  - I/O mechanisms and facilities
  - data structures
  - analysis algorithms
- How ?
  - starting point: almost empty but working skeleton of the interactive graphical application
  - iteratively introduce working modules - piece-wise and independently developed - inside that skeleton
- Projects
  - a common set of features is then progressively developped
  - eventually, a set of additional features and upgrades are proposed as standalone *mini-projects*

Grading

Grades

Grades are based on the following 3 items:

- quality of the produced code (8 pts)
- usage and understanding of the tools (8 pts)
- quality of work invested in the hands-on sessions as well as its progression (4 pts)

Warning

The work is performed by pairs of students, BUT students get their own grade!